Alameda County
Santa Rita Jail Smart Grid

Project Overview

Alameda County's Santa Rita Jail smart grid demonstration project in Dublin, California, is the country's largest CERTS-based* microgrid with renewable generation and large-scale energy storage. Designed and constructed by Chevron Energy Solutions, this first-of-its-kind project is anticipated to be a powerful enabler toward a smarter grid. It brings together multiple partners and technologies to deliver an essential component of the U.S. Department of Energy's plan to deploy an advanced, interconnected energy network capable of meeting the consumption needs of tomorrow.

With a prison population the size of most small American towns, Santa Rita Jail is the fifth largest county jail in the nation, requiring 3 megawatts (MW) of reliable and secure electricity 24 hours a day, seven days a week to power the million-square-foot facility. Any interruption to that power supply could have negative consequences for the Sheriff's Department staff or the inmates housed there. The self-sustaining smart grid, however, mitigates these concerns by integrating all of the jail's onsite generation with energy storage to ensure that power is never lost. Now, when a disturbance to the utility grid occurs, the jail can automatically disconnect seamlessly from the grid and operate independently until local utility power is restored.

The jail's completion of the smart grid is the culmination of several energy projects that date back to the California energy crisis in 2001. In response to that crisis, the County installed a 1.2 MW solar photovoltaic system on the jail's roof, one of the largest installations of its kind at the time, and reduced its energy usage through retrofits to the jail's central plant. The next milestone came in 2005, with the installation of a 1 MW fuel cell cogeneration plant that provides ultraclean energy and waste heat recovery. That project was followed in 2008 and 2009 with the implementation of multiple energy efficiency and water conservation measures to reduce the jail's peak electrical loads. In 2010, five small wind turbines were installed, further adding to the jail's renewable energy capacity. At each phase, Chevron Energy Solutions served as a key partner in design, engineering and construction.

FEATURES

- 1.2 MW rooftop solar PV system
- 1 MW fuel cell power plant with heat recovery for facility hot water and space heating
- Five 2.3 kW wind turbines
- Two 1.2 MW emergency backup diesel generators
- 2 MW advanced energy storage system
- 12 kV sub-cycle static disconnect switch
- "Islanding" capability
- Electric power export and import capability
- CERTS smart grid control logic

With the installation in 2011 of a 2 MW advanced energy storage system and an automatic disconnect switch, the facility evolved into a complete smart grid with full CERTS functionality—meaning, it now has the capability to "island" itself off of

*Consortium for Electric Reliability Technology Solutions

the main utility grid and independently generate and store its own energy. The distributed energy control system also serves to dramatically reduce peak demand during normal grid-connected operations or during a demand response event.

The Santa Rita Jail smart grid is the only CERTS-enabled system of its size and scale, providing a key pathway for reducing utility grid peak demand while improving power quality and reliability, increasing grid security, reducing grid congestion, and helping Alameda County meet its energy and environmental goals.

The project was funded by the U.S. Department of Energy, the California Energy Commission and the California Public Utilities Commission, and benefitted from partnerships between public and private entities, including Alameda County's General Services Agency, Chevron Energy Solutions, Pacific Gas and Electric Company, California ISO, Lawrence Berkeley National Laboratory, the National Renewable Energy Laboratory, and the University of Wisconsin.

DOE Modern Grid Trait	Santa Rita Jail Smart Grid Capability
Self-healing	Automatically detects and responds to actual and emerging transmission and distribution problems. By islanding, disturbances and power outages in the microgrid can be prevented.
Peak load reduction	Peak load reduction is accomplished by charging the energy storage system during off-peak periods and discharging it during peak periods.
Motivates and includes the consumer	Consumer is actively involved in smart grid deployment and control of distributed energy resources. Significant demand response capabilities support the grid.
Resists attack	Autonomous smart grid operation resists attack and reduces burden on the grid during restoration.
Provides power quality for 21st century needs	Uninterrupted power is reliably delivered to the consumer to consistently meet total consumer load.
Accommodates all generation and storage options	"Plug and play" convenience allows easy integration of diverse distributed energy resources (DER); this project accommodates a large-scale battery, photovoltaics, wind, a CHP fuel cell, and diesel generators.
Enables markets	Has potential to sell wholesale power back to the grid; enables PV, fuel cell, and storage markets.
Optimizes assets and operates efficiently	Monitoring and control system developed to optimize utilization of DER assets, and provide remote monitoring capability.

About Alameda County
Alameda County is California's seventh largest county, with more than 1.5 million residents. The County includes 14 cities as well as several unincorporated communities. Alameda County is governed by an elected Board of Supervisors, with each supervisor representing one of five geographical districts. County government is guided by a Strategic Vision, a far-reaching roadmap that integrates five priority areas including Environment and Sustainability. With a robust sustainability program Alameda County has established itself as a leader in areas including climate protection, ecosystem restoration, use of renewable energy and green building methods, recycling and waste reduction.

About Chevron Energy Solutions
Chevron Energy Solutions is one of the largest installers of solar power in the U.S. education market and has developed hundreds of projects that improve energy efficiency and provide renewable power for education, government, and business facilities. Chevron Energy Solutions develops and builds sustainable energy projects that increase energy efficiency and renewable power, reduce energy costs, and ensure reliable, high-quality energy for government, education and business facilities. Learn more at www.chevronenergy.com.

About CERTS
The Consortium for Electric Reliability Technology Solutions was formed in 1999 to research, develop, and disseminate new methods, tools, and technologies to protect and enhance the reliability of the U.S. electric power system in the transition to a competitive electricity market structure. Its program office is located at the Lawrence Berkeley National Laboratory. For more information, visit http://certs.lbl.gov/.

Acknowledgment: "This material is based upon work supported by the Department of Energy under Award Number DE-FC26-08NT02872."